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### **Brief Communication**

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Measuring the Cognition of Firesetting Individuals using Explicit and Implicit Measures

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### **Abstract**

This study examined un-apprehended deliberate firesetters' cognition. Relative to non-firesetters, un-apprehended firesetters reported higher explicitly measured fire interest. However, their reaction times (RTs) on a fire interest implicit LDT were inconsistent with these findings. They did, however, display a pattern of LDT RTs consistent with Dangerous World and Fire is Powerful beliefs.

Apprehended (i.e., arrested or convicted) and un-apprehended firesetters report higher levels of fire interest than non-firesetters (Barrowcliffe & Gannon, 2016; Gannon et al., 2013). Yet self-report measures allow participants to fake responses. Researchers have employed implicit measures examining non-conscious processes (e.g., the lexical decision task; LDT). On LDTs, individuals are reliably faster at recognizing a letter sequence as a word when it fits prior expectations of sentence completion (Snowden et al., 2011).

Ó Ciardha and Gannon (2012) hypothesized that firesetters hold any of five firesetting supportive beliefs: *Fire is Interesting*, *Fire is a Powerful Tool*, *Fire is Controllable*, *Normalization of Violence*, and *Dangerous World*. Unpublished explicit interview research with apprehended firesetters supports these beliefs (see Reynolds, 2012). However, other research has not yet examined them.

This research investigates fire interest beliefs as a primary aim. We predict un-apprehended firesetters will hold higher fire interest on an explicit self-report measure of fire interest relative to non-firesetters. We also predict that fire interest beliefs will be found using a less transparent LDT. As a secondary aim, we examine whether the remaining four proposed firesetting supportive beliefs will be found using an implicit LDT.

## Method

### Participants and Measures

Eighty-four participants aged 18 to 23 were recruited anonymously via social media (83.3% females).

Measures were presented online and randomized. A screening asked participants whether, since the age of 10<sup>1</sup>, they had ever deliberately set a fire and been apprehended for that fire. The Fire Interest Subscale (FIS) of the Fire Setting Scale (Gannon & Barrowcliffe, 2012) measured explicit fire interest ( $\alpha = .94$ ). The Impression Management subscale of Paulhus' Balanced Inventory of Desirable Responding (BIDR: 1988) measured impression management ( $\alpha = .69$ ).

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<sup>1</sup> In the UK children under 10 cannot receive a criminal conviction.

For the LDT, 45 comparable sentence stems were designed for each belief (e.g., *fires can be really...*) with three comparable word endings for each stem; firesetting belief supportive words (e.g., *exciting*), non-firesetting belief supportive words (e.g., *dangerous*), and pronounceable non-words (e.g., *emciting*). Reading speed was calculated from participants reading 20 randomized sentences (Fischler & Bloom; 1980). Stimuli were presented in black 16pt Arial text on a white screen (see Figure 1a for LDT trial format) programmed in millisecond.com.

## Procedure

The study was administered online. Participants completed a practice LDT and repeated this if they made four or more errors. Figure 1a shows the LDT trial format which measured Reaction Time (RT). Individuals who did not engage with the task appropriately were excluded from analyses. Participants were debriefed online.

## Results

We recruited 84 participants (20 unapprehended firesetters, 64 non-firesetters) to ensure we detected medium to large effect with .80 power<sup>2</sup>. Groups did not differ on age or gender. BIDR-IM was not significantly correlated with FIS or LDT RT outcome variables.

## LDT Analyses and Data Preparation

We report analyses unadjusted and adjusted for reading speed. Only correct LDT responses were analyzed. RTs were Winsorized<sup>3</sup> and totaled for each sentence ending type. Firesetting belief supportive RTs were subtracted from non-firesetting belief supportive RTs (see Figure 1b) with positive figures indicating faster firesetting belief responses.

## Primary Aim

Un-apprehended firesetters reported higher levels of fire interest relative to non-firesetters,  $t(82) = 2.12, p < .04; d = .47$ . For the Fire is Fascinating LDT, un-apprehended firesetters were

<sup>2</sup> Using G Power 3 a priori power analysis (Faul, Erdfelder, Lang, & Buchner, 2007).

<sup>3</sup> Excessively high and low RTs were amended to within two standard deviations of the mean.

*slower* classifying Fire is Fascinating belief supportive words, compared to non-firesetters, relative to non-belief supportive words, reading speed unadjusted,  $t(82) = 2.23$ ,  $p = .03$ ,  $d = .53$ ; reading speed adjusted,  $p = .04$ ,  $d = .51$  (see Figure 1b; primary aim).

## Secondary Aim

RTs were comparable across groups on Normalization of Violence and Fire is Controllable LDTs (see Figure 1b; secondary aim). However, for Dangerous World, un-apprehended firesetters were faster to classify firesetting belief supportive words relative to non-belief supportive words, reading speed unadjusted,  $t(82) = 2.64$ ,  $p = .01$ ,  $d = .70$ ; reading speed adjusted,  $p = .01$ ,  $d = .67$ . Further, for Fire is a Powerful Tool beliefs, differences were noted when reading speed was controlled for, reading speed unadjusted,  $t(82) = 1.80$ ,  $p = .08$ ,  $d = .50$ ; reading speed adjusted,  $p = .04$ ,  $d = .52$ .

## Discussion

This is the first study to examine firesetting supportive cognition using explicit and implicit measures. Compared to non-firesetters, un-apprehended firesetters self-reported significantly higher levels of fire interest on the FIS explicit measure. When fire interest beliefs were assessed implicitly groups significantly differed on their mean LDT RT difference by 96.18ms<sup>4</sup> and this was in the opposite direction of that hypothesized. Mean RT differences for the remaining firesetting beliefs on the LDT were in the expected direction. The RT difference for the Dangerous World LDT stimuli was significant. The RT difference for the Fire is Powerful stimuli only reached statistical significance when reading speed was adjusted.

Our findings support the growing body of literature showing that un-apprehended firesetters self-report higher levels of fire interest than non-firesetters. Our findings also expand the literature through providing support for Dangerous World beliefs in un-apprehended firesetters. Such beliefs, however, are not sufficient to explain firesetting behavior. We suggest

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<sup>4</sup> Unadjusted.

fire interest is one key facilitatory vulnerability likely to require intervention. Firesetter and non-firesetter differences on Fire is a Powerful Tool LDT stimuli were less clear-cut and require further investigation.

Un-apprehended firesetters were slower completing the Fire is Fascinating LDT stimuli. They may have been distracted by the fire interest related stimuli (see Gallagher-Duffy, MacKay, Duffy, Sullivan-Thomas, and Peterson-Badali, 2009). Researchers could replicate our LDT using eye tracking equipment to assess length and location of eye gaze.

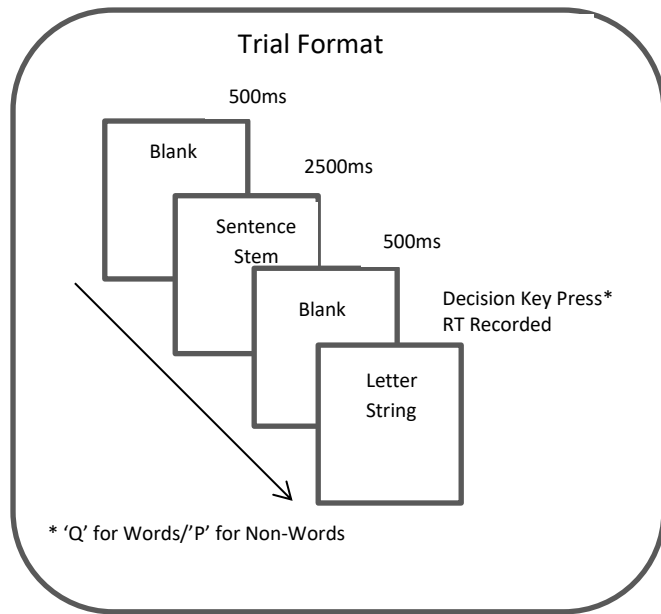


Figure 1a. Illustration of the LDT trial format.

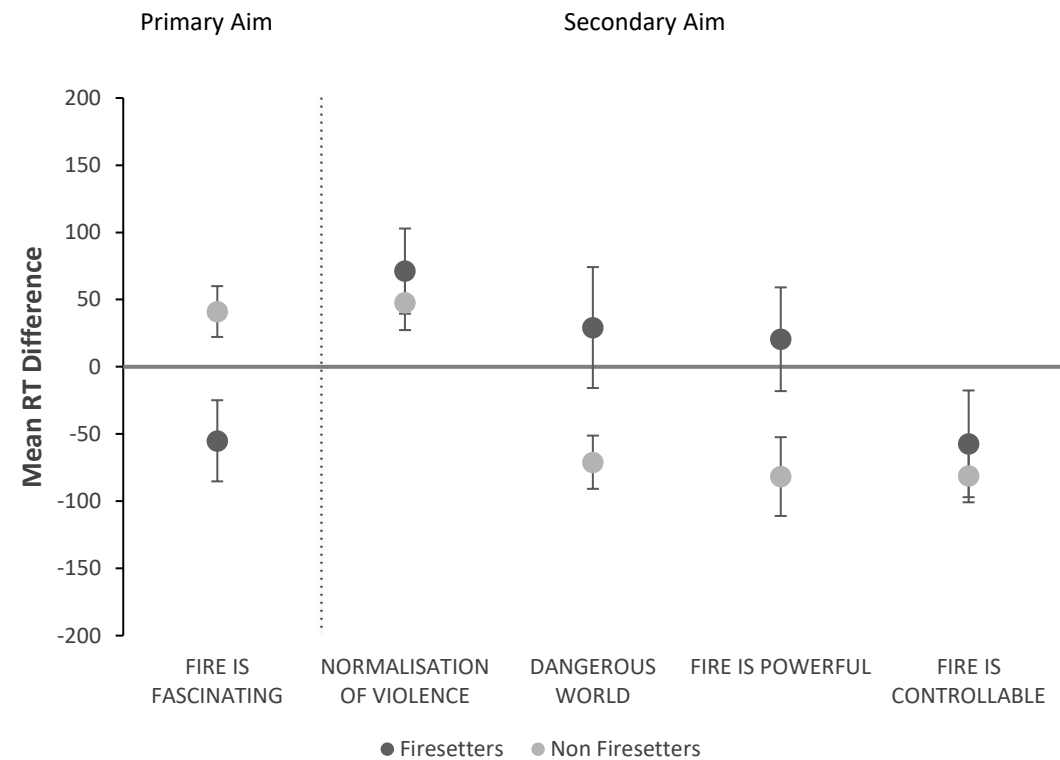


Figure 1b. Mean unadjusted RT differences on the LDT for the five beliefs that support firesetting.

Note: Positive scores indicate faster responses to beliefs that support firesetting. Error bars represent standard error of the mean.

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